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ORIGINAL ARTICLE

Sourcing energy services in business-to-business contexts: practices among end-customers

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Abstract Facing increased pressure to use renewable energy and achieve energy efficiency, organisations have the complex task of sourcing energy services from energy providers in business-to-business (B2B) contexts. We aimed to explore how customers in such contexts approach the sourcing of energy services. Our theoretical and empirical approach linked energy as a service offering and customer–provider interfaces used in sourcing energy services to elucidate the practices adopted in such sourcing by customers in B2B contexts. To that end, we employed a qualitative research approach using the Gioia methodology and conducted 18 semi-structured interviews with representatives of 18 firms in the B2B market for energy services in Sweden. Our results revealed two central categories of how energy services are sourced: basic and advanced. The theorising of those categories as forms of direct and indirect energy efficiency, combined with four types of energy services—information-, analysis-, improvement- and contract-oriented services, which include a description of energy services exchanged, where the customer uses the energy service, the customer's sourcing practices and characteristics of sourcing practices—provides important contributions to the literature on energy services. In turn, we propose a four-part typology of interfaces used by providers and customers of energy services that considers the type of services sourced.

Keywords Energy sourcing · B2B energy services · Energy sourcing strategy · Customer–provider interface

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Introduction

Providers of energy and energy services face mounting disruptions due to the introduction of innovative and sustainable business models (Gaspari et al., 2017), digital technology (IEA, 2017), and innovative energy services (Kowalska-Pyzalska, 2018), along with the increased use of performance-based contracts (Pätäri & Sinkkonen, 2014) and energy service collaborations (Backlund & Eidenskog, 2013). Even the entrance of new actors into the market for energy services has created disruptions (Brown et al., 2019; Halldórsson et al., 2018; Nolden et al., 2016). Energy services have traditionally been regarded as a commodity (Handfield, 2004)—flip a switch and the light is on—or a cost (Winston et al., 2017). Although the energy service market is viewed as a pivotal means of improving energy efficiency (European Commission, 2018) and the energy services sector is growing in many countries, customers' approaches in the business-to-business (B2B) sourcing of energy services can be challenging given the lack of consensus about what energy services are and who provides them (Benedetti et al., 2015; Bertoldi et al., 2006; Fell, 2017; Sorrell et al., 2009).

Of course, that perspective has started to shift as energy providers increasingly develop their offerings into advanced, customised energy-efficiency services and embrace energy performance contracts, or energy service contracts (ESCs) (Duplessis et al., 2012; Matschoss et al., 2015). However, even if implementing energy services into market offerings is expected to improve the orientation towards customers (Kindström & Ottosson, 2016), studies on service transitions in the sector have continued to assume traditional provider- and product-centric approaches to such offerings (Lütjen et al., 2017; Matschoss et al., 2015). Against that trend, extending the concept of energy services towards use- and result-oriented models can shed light on the nature of agreements between energy service companies and their clients (Benedetti et al., 2015), or *customers*, as they are referred to in this study, which generally revolve around the provider's business model and manage risk by using ESCs. Moreover, the literature suggests that energy service providers seek to enhance their offerings and integrate servitisation (Benedetti et al., 2015) and digitalisation (IEA, 2017), largely due to pressure from households (Weiller & Neely, 2014), service providers who manage facilities (Ancarani & Capaldo, 2005) and facilitators and intermediaries of capacity, trust, technical and administrative support (Bleyl et al., 2013) to lower transaction costs (Nolden et al., 2016) and/or encourage learning from one contract to another (Nolden & Sorrell, 2016). Although ESCs have been identified as an important way to overcome hurdles in developing the market for energy services, the practice primarily applies to only a subset of energy services (Sorrell, 2005). Advancing energy service offerings to align with servitisation (Halldórsson et al., 2018) and product–service systems (Benedetti et al., 2015) calls for a greater understanding of the extent to which end-customers, including industrial and commercial building owners (Badi, 2021), are developing their own sourcing practices that keep pace with those new offerings.

As suggested by the literature, however, that perspective remains somewhat unexplored (Fensel et al., 2014), and the energy service market continues to be viewed as fragmented, unpredictable and subject to often 'unknowledgeable and unwilling' customers (Badi, 2021). In response, following discussions on how to expand the energy system's boundaries (Jonsson et al., 2011), and given the general advancement of energy providers' offerings and the array of energy services offered by actors both established and new, the present article investigates how customers in B2B contexts approach the sourcing of energy services. To guide that investigation, we formulated two research questions (RQs):

RQ1. What characterises end-customers' practices of sourcing energy services?
RQ2. How do customer–provider interfaces enable and/or shape the sourcing of energy services?

We conceived *energy services* as including advice about energy efficiency, the provision of energy-efficient equipment, and/or building refurbishment, maintenance and operation, facility management and the sourcing of energy, including heat.

This article contributes to the body of knowledge about the demand side of energy services in at least two respects. First, we outline the appropriateness of B2B end-customers' (such as industrial or commercial building owners) sourcing strategies for basic and advanced energy services. Second, in characterising different types of ESCs, we propose a four-part typology of interfaces between providers and customers of energy services depending on the energy services sourced: Arm's-length interfaces for sourcing information-oriented energy services; standard interface for sourcing analysis-oriented energy services; efficient interface for sourcing improvement-oriented energy services; and innovative interface for sourcing contract-oriented energy services.

The remainder of this paper is structure as follows. The 'Conceptual background' section reviews literature on energy services, sourcing processes and buyer–supplier interfaces relevant to our work. The 'Method' section presents the method and empirical material used in the study. The 'Findings' section presents the results, along with an analysis of the empirical material offering new insights into how energy services are sourced. The article concludes with a discussion of our major results and their implications and limitations.

Conceptual background

Energy as a service offering

Bertoldi et al., (2006, p. 1820) discussed how energy services include a variety of activities, including energy analyses and audits, energy management, project design and implementation, maintenance and operation, the monitoring and evaluation of savings, property management, and both energy and equipment supply. Sorrell et al. (2009) added that energy services such as heating and lighting are provided through energy systems that involve combinations of capital equipment, labour, materials and marketable energy commodities such as electricity. Thus, energy services are conceived as offerings that rely on products, infrastructure and/or inputs such as labour (Haas et al., 2008; Jonsson et al., 2011). More recently, research has suggested that the basic character of energy services differs; some are rather simple, whereas others are highly complex (Bale et al., 2015), while some comprise standardised solutions and others customised ones (Fell, 2017). Nevertheless, no single definition of *energy services* dominates, perhaps (or precisely) because energy service offerings are so decidedly diverse (Badi, 2021; Nolden & Sorrell, 2016).

One way of capturing the variety inherent in energy services is by distinguishing the ends of energy use (that is, the customers' expected benefits) and the functions required to achieve those ends (that is, the providers' way of delivering energy that enables those benefits). Such a distinction has been noted by Benedetti et al. (2015) and included in Fell's (2017, p. 137) definition of *energy services* as 'functions performed using energy which are means to obtain or facilitate desired end services or states'.

Categories of energy services

Building upon the logic of transaction cost economics, Nolden and Sorrell (2016) offered a dyadic perspective on energy services that considers both energy service providers and the organisations buying those services. From that perspective, two types of contracts are used to outline service offerings—energy supply contracts and energy performance contracts—which shape the associated transaction costs, including risks and rewards shared between the parties involved. From another angle, Benedetti et al. (2015), in referring to the logics of product–service systems, proposed three types of energy services: product-oriented, use-oriented and result-oriented. Meanwhile, from the perspective of marketing services, Kindström et al. (2017) posited that energy services can be classified according to whether energy efficiency is provided directly or indirectly. Indirect energy services encompass services that provide information and advice without directly effecting any change (such as the implementation of new technology). For example, by providing information via energy audits that customers can act on later, such services indirectly and intangibly affect customers (Kindström et al., 2017). By contrast, direct energy services, such as changing lights or ventilation equipment on site (Fell, 2017), affect customers directly and tangibly. However, many energy services are complex and are often bundled into both direct and indirect offerings, which can range from preliminary studies of energy performance to direct energy services that actualise proposed changes to reduce energy use and/or energy costs. Furthermore, according to Fell (2007), different types of energy services demand different degrees of involvement from customers in the process of value creation.

Another categorisation of energy services distinguishes basic from advanced services (Kindström & Ottosson, 2016; Kindström et al., 2017). That categorisation differs from the mentioned distinction of indirect and direct services given its explicit focus on processes of value creation, as further developed by Badi (2021), among others. Whereas basic energy services commonly include the provision of energy statistics and information, energy audits, energy analysis and advice (Kindström & Ottosson, 2016), advanced services consist of the direct improvement of energy efficiency for customers, the financing of investments for customers, operations and maintenance, and functional contracts, including ones that stipulate a set indoor temperature (Kindström et al., 2017). Basic energy services represent services associated with, for instance, energy advice, education and training (that is, they do not entail activities in the customers' processes), whereas advanced energy services include activities that directly affect customers' processes of value creation, such as the maintenance of production equipment or energy mapping with suggestions for organisational measures to improve energy performance.

Sourcing energy services

The literature on energy services to date has demonstrated a firm focus on the market for and providers of energy services (e.g. Hannon et al., 2013; Yin & Qiu, 2022). In contrast, the perspective of customers comes into play when addressing outsourcing (Sorrell, 2005) or the use of intermediaries (Nolden & Sorrell, 2016) as forms of service contracting. In those cases, certain types of contract refer to clients' make-or-buy decisions or use of intermediaries. However, because outsourcing is only one subset of sourcing strategies (Kraljic, 1983), a broader understanding of sourcing in such research is needed. As for the literature on sourcing, while services are often viewed as being strategically important, they are also viewed as being difficult to source and use, which creates challenges for the sourcing process (Pemer et al., 2014). In response, organisations strive to establish sourcing processes by introducing policies, guidelines and other measures for service suppliers (Fitzsimmons et al., 1998).

Research has also shown that the process of sourcing services is different (Jackson et al., 1995; Stock & Zinszer, 1987) and more complex (Fitzsimmons et al., 1998) than the process of sourcing goods. Certain characteristics of services (such as intangibility, heterogeneity, simultaneity and perishability) affect the sourcing process in the sense that certain aspects become more important, difficult and/or different than when sourcing goods (Axelsson & Wynstra, 2002; Bullinger et al., 2003; Webster, 1993). Unlike goods, services are difficult to evaluate in advance of their acquisition, and general practices for sourcing goods cannot be directly applied to sourcing services.

Performance-focused energy service contracts

In examining the sourcing of energy services, academic studies have focused on ESCs, which involve the outsourcing of energy services as a cost-effective route to overcoming obstacles to energy efficiency (Backlund & Eidenskog, 2013; Bertoldi et al., 2006; Sorrell, 2005, 2007). Although ESCs may encompass the delivery of energy streams such as hot water, steam and electricity and/or the provision of energy services such as thermal comfort and illumination, no single standard dominates, and many ESCs comprise both (Sorrell, 2007; Vine, 2005). By contrast, a service-marketing approach to performance contracts adopts use-oriented contracts, wherein customers pay for access, or result-oriented contracts, wherein the provider takes over the activity of customers, who, in turn, pay for functional results. Establishing an ESC typically requires the customer to invest considerable resources (for example, technical, managerial, financial and legal resources) that may not be available in-house, and some may consider that the costs involved will likely outweigh the associated benefits. Thus, according to Sorrell (2007), the energy service offering of the ESC may be appropriate only for a subset of energy service providers and energy-using organisations.

In an adjacent stream of literature, Nolden et al. (2016) discussed energy service companies (ESCOs), which provide offerings that include energy information and control systems, energy audits, and the installation, operation and maintenance of equipment. Earlier, Larsen et al. (2012) defined an ESCO as ‘a company that provides energy-efficiency-related and other value-added services and for which performance contracting is a core part of its energy-efficiency services business’. ESCOs guarantee a specified level of energy savings over a period of several years, centred on improving customers' energy efficiency and thereby allowing customers to reduce their operating costs and transfer risks, increase their employees' productivity and focus attention on core activities (Badi, 2021; Bleyl et al., 2013; Nolde et al., 2017; Soroye & Nilsson, 2010; Sorrell, 2007; Vine, 2005). In Vine's (2005) estimation, ESCOs guarantee energy and/or financial savings for projects, and their compensation is linked to the project's ultimate outcome; that is, its performance. However, ESCOs remain poorly understood, if known at all, among potential customers, especially small- and medium-sized enterprises (Pätäri et al., 2016). Further, as Bleyl et al. (2013) put it, the energy market development is ultimately determined by whether customers decide to buy energy services.

Synthesising customer–provider interfaces in the sourcing of energy services

Whereas van der Valk and Rozemeijer (2009) proposed a structured process to overcome problems associated with sourcing services, Grönroos (1998) argued that services are produced and consumed interactively between providers and customers and thus require a sphere of joint interaction between the two parties marked by a high level of customer contact (Grönroos, 2004). The creation of such a sphere requires that an interface between potential customers and providers be established over time before contract negotiations even commence (Brennan & Turnbull, 1999). By extension, because the outputs of services do not exist independently of the provider–consumer relationship (Hill, 1999), the exchange of services largely depends on the provider–consumer interface (Sampson, 2000). In that sense, *interfaces* can be defined 'as the contact points between two autonomous organizations which are interdependent and seek to interact in the pursuit of a common goal' (Wren, 1967).

The chief purposes of customer–provider interfaces are to communicate about, coordinate, and adapt the activities and resources of the two firms in the customer–provider relationship (van der Valk et al., 2009). Characteristics of interfaces relate to aspects such as the adaptation of activities and specific investments made by the parties involved (Holmlund, 2004; Schurr et al., 2008), both of which aim to facilitate customer–provider collaboration and thereby achieving mutual benefits (Anderson & Narus, 1991). Wynstra et al. (2006) and van der Valk et al. (2009) added that, when sourcing services, several representatives from the customer's side are usually involved in the interface with the provider. For B2B customers, two approaches to managing the interface with providers when procuring services involve using an interactive team to communicate and coordinate with providers (Lakemond et al., 2006) or developing relationships with providers through mutually beneficial interfaces (Araujo et al., 1999; Gadde & Snehota, 2000). Beyond that, Badi (2021) examined triadic relationships in the context of energy services and how utility companies can facilitate the co-creation of value at the ESCO–customer interface. Further, network relationships with different actors enable companies to reduce transaction costs as well as risks associated with energy efficiency decisions (Dütschke et al., 2018; Palm & Backman, 2020).

As reviewed above, there is still little coherent understanding about what characterises end-customers' practices of sourcing energy services, and how customer–provider interfaces shape the sourcing of energy services. The literature on energy services, sourcing energy services and customer–provider interfaces served as a conceptual foundation of our study's RQs and guided our collection and analysis of data. The review revealed that customers' practices of sourcing energy services relate to four overall categories of such services supplied by providers: information-, analysis-, improvement- and contract energy services. We viewed those services in relation to a particular point of use in customers' organisations or operations (such as maintenance) and, in turn, to their actual sourcing practices. We attempt to identify these issues in the following sections.

Method

For our study, we adopted an explorative qualitative research method to facilitate our exploration of the phenomenon in question—that is, the sourcing of energy services—in its natural setting (Patton & Appelbaum, 2003) and our identification of causal mechanisms (Eisenhardt & Graebner, 2007) involved in that practice. By extension, our unit of analysis was the act of sourcing energy services seen from the customer firm's perspective.

Sweden's energy sector

Sweden's energy sector is undergoing a major transformation due to the increased use of renewable energy and changes on the market for energy (Nurdiawati & Urban, 2022). As customers engage more actively in the co-production of energy and energy services, new requirements have emerged. In parallel, sectors such as transportation are also undergoing a transformation due to electrification and have emerged as new customers for traditional energy providers (Hache et al., 2019). Experience in sectors such as manufacturing and services suggests that, to keep pace with such transformative changes, providers should engage with customers in new ways by advancing their service offerings (Baines & Lightfoot, 2014; Elf et al., 2022; Kumar et al., 2019). Although earlier studies on energy efficiency have emphasised the relational nature of energy service collaborations (Backlund & Eidenskog, 2013) and the co-creation of value at the customer–provider interface (Badi, 2021), B2B customers in Sweden have often treated energy as a commodity that is acquired through transactional, arm's-length interactions between buyers and providers. In any case, recent developments show that the energy sector has taken substantial steps towards developing customer offerings that range from basic to advanced services (Kindström et al., 2017).

In that context, an understanding of the energy sector seems to play an important role in helping customers transition towards improved energy efficiency in their operations, the use of renewable energy and electrification. Acquiring such competence requires the development of advanced energy service offerings, matched by customers' advanced sourcing practices. However, as Pätäri et al. (2016) indicated, the ESCO sector is not developing rapidly enough to become the model for executing projects of energy efficiency in Sweden.

Sampling

Our sampling procedure consisted of two steps. First, a combination of high variety sampling (Miles et al., 2020) and convenience sampling (Etikan et al., 2016) was used at the outset of our research to identify organisations in sectors that qualify as large energy consumers, and therefore the large customers of energy providers in Sweden. As a result, following the Swedish Energy Agency's (2017) report,[1] our sampling targeted companies in three sectors: housing and buildings, logistics and transportation, and production (for example, the manufacturing and processing industries). That range of actors is regarded as being relevant for constructing theory based on the comparison of different cases (Eisenhardt & Grabner, 2007) as well as augmenting the external validity of the results (Voss et al., 2002).

Second, within that range, we targeted organisations with high levels of experience (Pettigrew, 1990) in sourcing energy services or working with energy-efficiency initiatives that rely upon externally acquired resources. Such organisations included large (at least 250 employees), medium (50–249 employees) and small (fewer than 50 employees) firms. Such variety in our sample allowed us to compare empirical evidence across sectors and companies (Miles et al., 2020). Ultimately, our sample comprised 18 companies of diverse size that operate in the three mentioned sectors. For confidentiality reasons, we have not provided the participants' names in this article, but have instead numbered the companies from 1 to 18 and herein refer to them as C1, C2, C3, C4 and so forth.

Data collection

We gathered our empirical material primarily via semi-structured interviews with respondents at the companies, all of whom are customers of energy providers. The goal of the semi-structured interviews was to gather perspectives on and underlying reasons, opinions and motivations for sourcing practices that cannot be observed or discovered in other ways (Blumberg et al., 2011). To that end, we set priorities and contemplated which questions would encourage participants to speak openly and at length (Baker, 1997) in describing their processes of sourcing energy services.

We interviewed informants at multiple levels of their organisations, including top management and operations staff (such as engineers and technicians). A document that briefly summarised the study's objectives and expectations was sent as an attachment in an initial email, along with a short presentation of the study and an explanation of why they were being contacted. As detailed in Table 1, 18 interviews were conducted with top, middle and operations managers, technicians, and engineers at 18 firms in Sweden. We sampled companies until theoretical saturation was reached; that is, until the interview data ceased to yield any new conceptual themes or insights (Fusch & Ness, 2015).

Interviews were conducted in Swedish and lasted 40–70 min each. All interviews were recorded and transcribed, and extensive field notes were taken during every interview in order to be able to later reconcile any misunderstanding (Eisenhardt et al., 2016). Data collection lasted 7 months, from January to August 2019. All of the interviews were guided by a

[1] According to the Swedish Energy Agency (2017), end-users of energy in Sweden occur in three sectors: the industry sector, the transport sector and the residential and service sector. Whereas the industrial sector uses energy, often biofuel and electricity, to operate processes, the transport sector uses energy to transport people or goods within the country. Although the sector typically uses oil-derived products in the form of petrol, diesel and aviation fuel, electricity and biofuels are a growing source of energy for transport. Last, the residential and service sector mainly uses energy derived from district heating, electricity, oil and biofuels.

Table 1 A list of conducted interviews

Company	Size of the company	Informant's position	Sector	Number of interviews	Duration
C1	Large	Energy manager	Manufacturing and process	1	90 min
C2	Large	Energy manager	Manufacturing and process	1	130 min
C3	Large	Energy advisor/senior maintenance	Manufacturing and process	1	90 min
C4	Small	CEO	Manufacturing and process	1	70 min
C5	Large	Energy manager	Manufacturing and process	1	60 min
C6	Small	CEO	Manufacturing and process	1	70 min
C7	Large	Procurement manager	Manufacturing and process	1	120 min
C8	Small	CEO	Manufacturing and process	1	70 min
C9	Medium	CEO	Manufacturing and process	1	60 min
C10	Large	Technical director	Housing/buildings	1	90 min
C11	Medium	CEO	Housing/buildings	1	60 min
C12	Large	Energy manager and sustainability manager	Housing/buildings	1	90 min
C13	Medium	Energy manager	Housing/buildings	1	90 min
C14	Large	CEO	Logistics and transportation	1	60 min
C15	Large	Director of operations	Logistics and transportation	1	60 min
C16	Small	CEO	Logistics and transportation	1	90 min
C17	Large	CEO	Logistics and transportation	1	120 min
C18	Medium	Purchasing manager	Logistics and transportation	1	60 min

semi-structured questionnaire that served as a checklist throughout the interviews. Following the principles of the Gioia methodology, we started with a preconceived structured interview guide that was suited to our study's purpose and RQs but flexible enough to change as our research progressed (Gioia et al., 2013). The interview guide addressed six topics in six sections: (1) the use of energy, (2) types of energy services sourced, (3) the process of sourcing such services, (4) energy service suppliers, (5) customer–provider interfaces, and (6) the energy market in Sweden.

The data from the interviews were complemented with secondary evidence from annual reports and product brochures from the energy companies, along with media articles, news reports and email correspondence (Guest et al., 2006), as well as presentations at public events in the energy sector. In total, we reviewed and analysed 21 reports.

Data analysis

Considering the different approaches to constructing theory in qualitative research (Gehman et al., 2018), we opted to use the Gioia methodology, which is designed to provide qualitative rigour in qualitative research (Gioia et al., 2013). The Gioia methodology holds that organisational phenomena are socially constructed by 'people [who] know what they are trying to do and can explain their thoughts, intentions, and actions' (Gioia et al., 2013, p. 17). Along those lines, we sought to maintain focus on the experiences of our interviewees when interpreting the data that they provided, which allowed us to improve our understanding of how customers in B2B contexts approach the sourcing of energy services.

We approached the analysis of the empirical material in multiple ways (Nag & Gioia, 2012) across four stages. In stage 1 (understanding the context), to familiarise ourselves with the context and identify key issues therein, we first read the empirical material with an open mind and without making any assumptions, which allowed us to develop a comprehensive description of the empirical setting (Langley, 1999). Next, we used NVivo to run a word frequency query within the interview transcripts in order to identify common terms used in them, as well as to construct word tree searches to identify the recurring phrases surrounding the words.

In stage 2 (coding), we employed both a priori and a posteriori coding strategies. A priori coding involved referring to concepts presented in the 'Conceptual background' section (energy services, energy service sourcing, and customer–provider interfaces), whereas a posteriori coding entailed systematically coding the empirical material (that is, the interview transcripts, field notes, and all secondary data) using NVivo (Hoover & Koerber, 2011). NVivo is commonly used at various stages in analysing qualitative data, including the categorisation and thematic analysis of textual data (Miles et al., 2020).

In stage 3 (categorising themes), we again used NVivo to create first- and second-order categories to structure the data, derive meaning from the data and compile the aggregated subcategories (Miles et al., 2020; Nag & Gioia, 2012). The first-order categories followed informant terms, while the second-order categories characterised a more abstract theoretical level of themes, dimensions and the larger narrative (Gioia et al., 2013, p. 20). Table 2 shows examples of the NVivo codes that emerged from our data. Last, in stage 4 (extracting links and associations), we extracted links and associations between the categories (Voss et al., 2016) based on the codes from NVivo and our own discussions. That approach resulted in additional interpretations of how customers handle the sourcing of energy services.

In relation to RQ1 ('What characterises end-customers' practices of sourcing energy services?'), the literature addressing categories of energy services (Kindström & Ottosson, 2016; Kindström et al., 2017) contributed to our understanding of how customers in B2B contexts approach the sourcing of energy services and their practices therein, namely in two service categories: basic energy services and advanced energy services.

In relation to RQ2 ('How do customer–provider interfaces enable and/or shape the sourcing of energy services?') and based on our derived understanding of energy as a service offering (e.g. Badi, 2021; Bale et al., 2015; Bertoldi et al., 2006; Fell, 2017; Sorrell, 2005), categories of energy services according to literature (e.g.Kindström & Ottosson, 2016; Kindström et al., 2017; Nolden & Sorrell, 2016) and as stipulated by policy makers stimulating market-orientation of energy providers (e.g. Swedish Energy Agency, 2013), sourcing of such services (Axelsson & Wynstra, 2002; Bullinger et al., 2003; Nolden & Sorrell, 2016), customer–provider interfaces in that process (e.g. Badi,

Table 2 Coding—example of Nvivo code for energy services and their characteristics

Code (in vivo or a priori)	Meaning (brief description)	Quotes from interview or examples of participants' words
Energy services information	It relates to the acquisition of knowledge about energy use. For example, the sourcing of energy usage data from energy companies and product facts	“.. when we search for information for the improvement of energy utilization, it is important to check all available possibilities and select the most appropriate in terms of price…”

2021; Grönroos, 2004; van der Valk et al., 2009; Wynstra et al., 2006) and our thematic coding (Nag & Gioia, 2012), we concluded that the end-customers' sourcing practices vary across four overarching categories of energy services: information-, analysis-, improvement- and contract-oriented services (see Table 3). These four categories are used to describe the findings, that is, customers' sourcing practices when buying energy services. Following that elaborated framework, we conducted an additional analysis of the empirical data that resulted in four propositions for a four-part typology of customer–provider energy-service interfaces: arm's-length, standard, efficient and innovative. Thus, the discussion section focuses on these interfaces.

Finally, we evaluated our results in relation to comparable published findings (Miles et al, 2020), and, as recommended by Griggs (1987) and Patton (2002), we have included quotations from the interviews in this article to provide support for our interpretation of the data and to illustrate our results.

Research quality

To improve the quality of our research design, we followed the criteria and practice outlined by Aastrup and Halldórsson (2003) and Miles et al. (2020). Credibility was enhanced by using a structured approach to data coding and analysis and by constructing an audit trail as a means of tracking decisions made throughout the research process (Bowen, 2009). Meanwhile, transferability was enhanced through the verification of our results at a research seminar with academics and at a workshop with practitioners in the energy sector. Using an interview guide and interview questions that took common characteristics of energy services into consideration also enhanced the dependability of our results, which we strengthened by collating multiple sources of evidence. Last, the description of our research design and analytical procedures supports the confirmability of our study, as do the use of quotations herein and our provision of a table summarising our findings (see Table 3) as a means of demonstrating an audit trail and chain of evidence.

Findings

This section presents our major empirical findings about how customers in B2B contexts handle the sourcing of energy services and the chief characteristics of their sourcing practices. The findings are organised around four types of energy services derived from our conceptual framework and shown in Table 3: information-, analysis-, improvement- and contract-oriented services.

Overall, our findings suggest that most customers in our sample do not explicitly regard energy service offerings as commodities or as advanced services in their sourcing activity. Thus, the sourcing of energy services in B2B contexts seems somewhat ambiguous. For example, the technical director at C10, while addressing sourcing from an energy provider, stated, 'So far, we haven't used that term, *energy services*. It might be something that we'll look into in the future'. Similarly, the energy manager at C2 expressed an uncertain view on energy services as offerings but nevertheless outlined their importance in the firm's operations:

> We don't talk about "energy services" here. Instead, we talk about "operations", free of interruption and how we should not jeopardise any research and development activities due to energy issues. After that, there is an ongoing work towards achieving energy efficiency, of course.

The energy manager's perspective is one of several examples indicating that customers of energy services typically lack a clear knowledge about which energy services are offered by their energy providers, which complicated the ability of our interviewees to articulate a defined strategy for the sourcing of such services. In light of our theoretical framework and our empirical results, it seems clear that practices of sourcing energy services in B2B contexts would benefit from a more thorough understanding of the distinction of basic versus advanced services, which can be divided into four generic types of service offerings. Those four types are displayed in column 1 of Table 3 and the energy sourcing practices that related to them are shown in columns 4 and 5.

Generally speaking, the findings also show that practices of sourcing energy services vary according to their application by the customer, both in terms of the energy services exchanged as well as where and for what purpose the customer uses the energy, as shown in columns 2 and 3 of Table 3.

Table 3 Customer's sourcing practices of basic and advance energy services

	i. Type of Energy Service	ii. Description of energy service exchanged	iii. Where is the energy service used by the customer	iv. Customer's sourcing practices	v. Characteristics of sourcing practices
Basic energy services	Information	• Energy consultancy • Energy statistics • Energy audits • Visualization of energy use	• Facilities (C4, C14, C8, C11, C15) • Maintenance (C6, C11, C16)	• Request for proposal (information solicit bids from suppliers, often made through a bidding process) • Cost-focused sourcing (e.g., bidding approach, cheapest price) • Own production	• Easy to measure, provides benchmarking data • Low cost and administrative burden • Difficult to measure success of the service • Legal agreements
	Analysis	• Energy mapping with suggestions for measures • Energy-efficiency management • Education/Training that contributes with knowledge about energy use	• Facilities (C10, C13) • Maintenance (C13, C10, C12, C15, C17) • Production (C8, C9)	• Competitive sourcing and formalized bidding *(e.g., best price)* • Initiative-level metric systems (e.g., measurement of energy savings potential, ex-ante or ex -post). • Own production	• Decentralized sourcing structure • Low cost and administrative burden • It can limit creativity of the provider and overemphasize trivial issues • Difficult to monitor interim progress • Legal agreements
Advanced energy services	Improvements	• Organizational measures, e.g. new routines • Operation and maintenance of equipment • Installation of equipment that contributes to energy efficiency • Green buildings, cars, trucks • Energy supervision agreements	• Facilities (C10, C13) • Maintenance (C13, C10, C12, C17) • Production (C3, C1, C9) • Valued added to products or service offerings (C7, C2, C3)	• Use pre-established contacts • Centre-led sourcing, i.e. a hybrid of centralized and decentralized sourcing structure • *Outcome-oriented* (e.g., energy reductions through evaluations of improved/installed "measures," i.e. components such as light bulbs, and new equipment) • Value-adding and supplier collaboration	• Overall energy cost reduction is the main driver • Allows for early problem detection • Risk evaluation • Monitoring and performance • Transfer more responsibility/risk to supplier • Outcome-based contracts
	Contracts	• Guaranteed energy saving • Energy Performance Contracting (EPC) • Energy cooperation • Comprehensive measures to fit the needs of the customer • Delivery of energy-efficiency-related and value-added products or services	• Facilities (C3, C2, C1) • Maintenance (C3, C2, C1) • Production (C3, C2, C1) • Valued added to products or service offerings (C3, C2, C1)	• Value-creating sourcing (e.g. focus on innovation, customer's customer perceived value) • Focus on sustainability (long-term financial costs and benefits, environmental issues, corporate social responsibility, etc) • Focus on technological disruption (e.g., new solutions that alters the way which consumers, the industry, or the company operates, enhance energy efficiency in smart factories, big data, energy apps, and digitalization of energy systems)	• Part of operations and business strategy • Strategic value-add activity • Close collaboration with suppliers to achieve innovative solutions • Assigns resources to where they can be used most effectively to the overall business strategy • Share responsibility/risk with supplier • Costly to develop new contracts for each project • Behaviour-based contracts; focus on supplier relationship.

Information-oriented energy services

Information-oriented energy services refer to the provision of, for example, energy usage data, measurement data, product tests and product facts, with the aim of increasing customers' knowledge about energy use but without providing any proposals for measures or training. The empirical data reveal that the information-related type of energy services can be divided into subcategories (see Table 3) such as *energy consultancy*, which includes actors who focus on providing information about the optimisation and efficiency of energy usage, as well as about the sources from which the energy derives. Energy consultancy is not usually standardised but is instead developed based on the particular customer's needs. As such, it can offer unique information for complex projects such as a company's complete overhaul of its energy use, including in its facilities, production processes and transportation, as well as provide advice about switching from one type of energy to another.

By contrast, *energy statistics* refer to facts and evidence that provide customers with an overview of their energy use and benchmark it in relation to comparable actors. Energy statistics can be standard statistics—regarding, for instance, the supply and use of energy in general, energy prices, energy markets both domestic and international and/or the overall energy sector—or statistics produced by providers or coproduced between them and customers. Finally, *energy audits* include the analysis of energy flows for use in a building, for example. Such audits may suggest a process or system for reducing the amount of energy put into the system without negatively affecting the output. An energy audit can be the first step in identifying opportunities to improve energy efficiency.

Where customers use information-oriented energy services

The data show that customers (C4, C8, C11, C14 and C15) use information-oriented energy services to improve their facilities and/or in the maintenance of, for example, in-house energy systems (C6, C11 and C16). For instance, the CEO at C8 stated, 'When we hire consultants, we usually focus on how their work can help us to improve the effective use of energy in our properties'. The CEO at C11 explained that tendency in relation to activities that are ad hoc instead of part of daily operations: 'We monitor the use of energy in our facilities continuously, which means that we sometimes hire experts who can assist us with maintenance activities'.

Customers' practices for sourcing information-oriented energy services

The data suggest that customers often source information-oriented energy services in a transactional way, in which market mechanisms play an important role. They typically attempt to be economical in their approach and evaluate distinct options available before choosing the most convenient one in terms of price and delivery. For example, the CEO at C14, which operates in the housing and buildings industry, stated:

> It is crucial to keep our operating costs low, especially considering that we work with tight financial margins. So, when we search for information to improve our energy utilisation, it is important to check all available possibilities and select the most appropriate in terms of price.

Other customers (C6, C12, C14 and C16) highlighted that requesting proposals from suppliers, often made via a bidding process, and reaching an agreement regarding the price of the energy service are necessary elements of their sourcing decisions. That tendency suggests that sourcing information-oriented energy services commonly follows a cost-focused approach in which price plays a fundamental role. As a sustainable manager at C12 explained:

> We went out with a request that we opened up for bidding ... I think that we contacted eight, nine consultants and then we took on four of them to do one facility each. Then we made an evaluation and selected two of them for the project.

Characteristics of customers' practices for sourcing information-oriented energy services

Our data also highlight that customers develop their own methods of sourcing information-oriented energy services. In those methods, they need a certain level of standardisation so that acquired information can be measured and benchmarked with other providers. As the energy manager at C12 noted:

> It depends on who makes the report. If the energy calculations are correct and connected to, for example, an investment, then they can be used to make comparisons. Theoretically, a report can be correct, but it may cause serious problems when put into practice.

As Table 3 shows, customers tend to prefer information-oriented energy services that do not entail high additional costs and are relatively easy to administer. For example, the CEO at C4 stated, 'We need something that's easy to use, something like a regular blood pressure monitor to check the blood pressure now and then but in terms of energy use'.

By contrast, other customers (C15 and C4) indicated the potential difficulty of measuring the quality of service, which highlights some uncertainty in sourcing information-oriented energy services. The CEO at C15 remarked:

> We may hire consultants to provide certain specific information for the actual implementation of some changes … However, it's very difficult to know the exact extent to which the information has ultimately been helpful.

The data also reveal that legal agreements play an important role in sourcing information-oriented energy services and that customers tend to prefer detailed contracts; for example, stipulating that the information is delivered within a particular agreed-upon time frame under specific parameters included in the legal agreement. The CEO at C11 emphasised:

> It's important to define in the contract what kind of information is needed, such as information about energy use in our facilities, to avoid getting information that won't help us in a concrete way. We also typically delineate in the contract when we want the report to be delivered.

Analysis-oriented energy services

Analysis-oriented energy services entail the analysis of information about energy use, including energy statistics, energy maps, energy declarations and other energy data. Such energy services offer the analysis of the customer's energy use based on energy maps, for instance, with suggestions for measures to put into action. To that end, providers process the information with the aim of offering suggestions to customers about measures for achieving energy efficiency or providing training. However, it is up to the customer to decide whether those recommendations are implemented; for example, implementing energy management systems that allow the customer to receive assistance from an external actor in changing and implementing new routines.

The empirical material indicates different types of energy services within analysis-oriented energy services (see Table 3). For example, *energy mapping with suggestions for measures* refers to systematically gathering knowledge about the customer's energy consumption and pinpointing opportunities to increase energy efficiency. Such services not only entail conducting energy audits of, for example, buildings and industrial sites, but can also take a holistic approach with the goal of defining integrated energy solutions across the organisation. Thus, energy maps help identify key areas where energy use can be improved and an energy balance created concerning the gain and loss of factors that affect the energy system. Based on the energy mapping performed, measures to increase the customer's energy efficiency are proposed.

By contrast, *energy-efficiency management* refers to the measurement and control of energy use. Such services may provide functions that allow customers to gather data and insights in order to make more informed decisions about energy activities across their operations. Beyond that, *education and/or training about energy use* refers to instructions that support and/or reinforce the customer's energy-efficiency objectives. Such education and training can help to change workplace behaviours and engage employees in creating a culture of saving energy and thereby improving the organisation's energy use.

Where customers use analysis-oriented energy services

The data reveal that customers commonly use analysis-oriented energy services to improve energy efficiency in existing and new buildings (C10 and C13), where energy is used for heating, cooling, ventilation, lighting, cooking, heating water, refrigeration, powering mechanical devices and so on. Along those lines, the technical director at C10 stated:

> We're constantly trying to get better at identifying how energy is used, where it's wasted, and how it can be used more effectively and efficiently in our buildings. Well-designed and well-constructed new buildings represent the best opportunity for reducing heating, cooling, ventilating, and lighting loads.

However, customers also perceived that the suggestions received from such services can be vague. The energy manager at C13 explained:

> I never saw the person that developed the report again. It doesn't really feel like they had the basic knowledge to do energy mapping. And so I start to think about why they're allowed to do this kind of work.

The CEO at C11 concurred, stating:

> We don't spend much money on it. On the contrary, other companies hire expensive consultants that give them very complicated reports. But in reality, you don't do much with those reports. We actually do the opposite, because we do a lot by ourselves internally.

Other customers revealed that they focus on energy mapping to, for example, establish and maintain effective energy management systems for monitoring and controlling energy use in large buildings (C9, C10, C12, C13, C15 and C17) and to improve energy efficiency in production facilities (C8 and C9). As the CEO at C9 disclosed:

> Our energy mapping very much focused on every building in which we consume a lot of energy. We also looked at the smelter. We tried to pick the lowest-hanging fruit first. It's smart. That is to say, it's cheap but accomplishes quite a lot … We have some buildings with very high ceilings, so we put in fans that depress the hot air to prevent all of the heat from going up to the roof. Now we can lower the temperature or the supply of heat in the buildings.

In the same vein, the energy manager at C12 highlighted, 'Our employees received training in energy management especially our technicians. Then we built up a structured way of working with our energy use'.

Customers' practices for sourcing analysis-oriented energy services

The data suggest that customers seeking analysis-oriented energy services tend to have a decentralised structure. Therein, decision-making is centred in the respective departments at the customer's firm that are responsible for each project expected to improve energy efficiency. As Table 3 shows, customers often source analysis-oriented energy services following a cost-focused approach that benefits from competition among providers and uses formalised bidding processes. The CEO at C8 said:

> We're now in the process of rebuilding our factory. We've contacted several companies that can help us improve our energy use. Although we got a proposal from a company that we're familiar with, we prefer to explore alternatives first to make sure that the price is right.

Customers also emphasised the importance of being able to measure the results of the services rendered in terms of energy savings, both before and after their implementation. In that process, the initiative-level metric systems used have distinct objectives, such as comparing different buildings' energy efficiency or comparing vehicles that use different fuels.

Characteristics of customers' practices for sourcing analysis-oriented energy services

The empirical material shows that customers (C8, C10, C13 and C17) commonly prefer analysis-oriented energy services with low costs and minimal administrative burden. However, customers also acknowledged that sourcing strategies focused on getting the lowest price can limit the creativity of the service provider and overemphasise trivial problems with unenlightening solutions instead of focusing on more complex problems that require complex solutions. Likewise, it can be difficult to monitor progress in the interim and to venture beyond providing suggestions to ultimately take responsibility for the outcomes of the analysis. As the energy manager at C13 put it, 'Consultants today come in and conduct individual projects. Then they disappear'. The technical director at C10 concurred, stating:

> Consultants who conduct energy mapping never take any responsibility for the results. I know that ones who've conducted energy mapping in our facilities have a background in business and economics.

Customers in our study also generally expressed a preference for a well-defined legal framework when sourcing analysis-oriented energy services. However, the data also suggest that customers try to alter internal mechanisms in order to deal with, for example, energy maps with their own measures, as well as to train their own personnel about energy use.

Improvement-oriented energy services

Improvement-oriented energy services refer to the delivery of solutions that contribute to improving energy efficiency, including organisational measures (such as new routines); the improved operation and maintenance of equipment; the installation of equipment that facilitates energy efficiency; and the creation of green buildings, energy-efficient transport and energy supervision agreements. Such services engage both service providers and customers in devising and implementing measures that directly increase the customers' energy efficiency. For example, the provider may perform improvements such as the installation and replacement of equipment in the customer's production facilities that reduce the cost of the customer's energy consumption. Legal agreements for such services commonly stipulate that the service rendered will lead to improved energy efficiency and reduce energy waste.

Among such services, *energy supervision agreements* refer to the implementation of mechanisms to monitor technical installations and other aspects related to energy consumption within the organisation. Such agreements may offer custom-designed solutions to reduce energy costs and consumption based on the results of energy mapping. For customers, such services seems to be part of a wider solution to improve competitiveness, reduce costs, ensure business continuity and progressively build a better, greener brand.

Where customers use improvement-oriented energy services

The data suggest that customers use improvement-oriented energy services in domains such as facility operations (C10 and C13), maintenance (C10, C13, C12 and C17) and production (C1, C3 and C9). For example, the CEO at C3 disclosed the following:

> We've learnt to make better demands when we buy production machines. We require machines that are more energy efficient and use less energy. We focus on lower energy waste, and we work with aspects of maintenance following our energy kaizen and so on. We use lighting techniques; for example, we replace, T5, T8s, and halogen bulbs with LEDs [*light-emitting diodes*]. That's something that technology can do: minimise the use of compressed air. Changing technology can mean using electric motors instead of compressed air.

Improvement-oriented energy services can also help create value-added products and/or service offerings, as highlighted by several respondents (C3, C7 and C10). As a case in point, the technical director at C3 stated:

> Becoming more efficient in using energy in our facilities and production processes means that we can not only lower energy costs but also develop a more sustainable company. That's a factor that our customers and society in general value more and more and can give us a competitive advantage over our competitors.

Customers' practices for sourcing improvement-oriented energy services

Most customers in our sample have a hybrid centralised–decentralised sourcing structure (that is, centre-led sourcing) for sourcing improvement-oriented energy services. Sourcing practices commonly involve the use of pre-established contacts and focus on the outcomes of the service (for example, reduced energy use via improved or installed measures such as light bulbs and production equipment), as well as value-adding and collaboration with the service provider. The CEO at C11 explained:

> We don't have a specific department that's responsible for purchasing those sorts of services [improvement-oriented energy services]. It's not something that we use here. Each department manages different projects, each of which are part of the company's overall operations. Everyone uses their contacts to find reliable alternatives that guarantee positive results, not only in terms of energy use but that also add value to our business. It's complicated and difficult to achieve if you don't collaborate with someone who knows your company well and understands your position.

Characteristics of customers' practices for sourcing improvement-oriented energy services

As Table 3 shows, a main driver for the sourcing of improvement-oriented energy services is reducing overall energy costs, along with possibly detecting risks early, evaluating them, and transferring more responsibility to service providers. As an executive at C7 explained:

> Reducing energy costs is extremely important, but it can also be a process that reveals problems before they become more complicated. For example, we may have to invest in a production plant due to certain problems. If those problems aren't detected at the right time, then the costs later on may be very high. For that reason, it's essential that our collaborators work closely with us to be part of our company's development.

Outcome-based legal contracts are common when sourcing such services. However, due to the complexity of some projects, it is difficult to cover all of the parameters that may emerge, which urges customers to use relational mechanisms to cope with such uncertainty. For example, the energy manager at C2 commented:

> When we started with this project, we focused not only on improving our energy use but also on ways to improve the company in general. We have many processes that are intertwined, including innovation, production, and sales. It's very difficult to separate all those areas and write all of the details out in a contract. Obviously, we sign contracts with our partners, but they're more relevant before we start a project or maybe at the beginning of the project. After some time working together, there's not much talk about contracts because our communication helps us to solve problems as they arise.

Contract-oriented energy services

As Table 3 shows, *contract-oriented energy services* refer to more complex energy services such as guaranteed energy savings, energy performance contracting, energy efficiency cooperation, comprehensive measures to fit the needs of customers and the delivery of energy-efficiency-related and value-added products or services. Such services involve a greater number of critical resources and the engagement of both the provider and the customer. For example, if the customer asks the provider to take a holistic approach towards guaranteed energy savings, the provider must possess in-depth knowledge about the customer's operations and anchor the project within the overall organisation.

Where customers use contract-oriented energy services

The data suggest that customers use contract-oriented energy services in the operation of their facilities, maintenance and production (C1–C3), as well as to create value-added products and service offerings. For example, the energy manager at C13 emphasised:

> Then we got into wind power. The project started in 2003, and now we have renewable energy and supply all our buildings with it ... It's been very positive for our customers.

The CEO at C17 explained that, in their organisation, 'We have a dialogue with the vehicle manufacturers. We're shifting towards a business model of operational leasing'.

From the customers' perspective, contract-oriented energy services should not only be able to provide energy-efficient solutions but also add value to the customers' products and services; that is, services that advance from basic offerings to value-added solutions that can improve customers' opportunities for added value and their revenue streams.

Customers' practices for sourcing contract-oriented energy services

Table 3 indicates that, when sourcing contract-oriented energy services, some customers focus on value-creating sourcing (such as innovation and the customer's perceived value), sustainability (long-term financial costs and benefits, environmental issues and corporate social responsibility) and technological disruption (for example, new solutions that alter how consumers, the industry or the company operates and/or enhance energy efficiency via smart factories, big data, energy apps and the digitalisation of energy systems). On that topic, the energy manager at C1 explained:

> Sustainable operations, sustainable offerings, and responsible partners: If you look at what those mean, then it's clear that it's about our products. And that's why we say that our products will help to reduce CO_2 emissions by 10 million tonnes by 2020. And then we'll have a sustainable business ... Yes, a fossil-free 2045 … There are a number of initiatives that we work with. It's about eliminating emissions from fossil fuels and CO_2 emissions from fossil fuels and reducing the amount of purchased energy, so to make energy efficient. And it's about fossil-free internal transport. The other area of sustainability relates to responsible partners ... ethical policies, personnel issues, and things like that.

Technologies such as robotic process automation, artificial intelligence and machine learning are also becoming increasingly valuable in terms of addressing the challenges of energy efficiency and thus play a fundamental role in the demand and supply of energy services. For example, algorithms are often developed to observe, predict and respond to energy use. On that topic, the energy manager at C2 said:

> Due to the increased complexity of energy services and management, we've partnered with the supplier to reduce the energy costs of our operations using advanced technology. At the production sites, innovative automation has helped to reduce power consumption without compromising performance.

Instead of cost-focused sourcing approaches and formalised bidding processes, decentralised sourcing structures and behaviour-based contracts with service providers are common when sourcing contract-oriented energy services. The energy manager at C1 stated:

> When many people are involved in a project, it becomes a collaboration. For example, there can be architects, construction project managers, engineers, etc. … In the early stages when you're working on detailed plans, you need to have a good contact network and choose the right partner.

Characteristics of customers' practices for sourcing contract-oriented energy services

The empirical material indicates that customers (C1–C3) commonly source contract-oriented energy services as part of their operations and business strategies. In that light, sourcing such services is a short- and long-term strategic value-adding activity that focuses on close collaboration with service providers to achieve innovative solutions and assign resources to areas where they can be used most effectively as part of the overall business strategy. As Table 3 shows, sourcing practices also entail sharing responsibilities and risks with service providers, and decreasing the costs of developing new contracts for new projects. As the energy manager at C3 noted, 'It's a way to increase the value of our products and services and to reduce the cost and number of non-value-adding activities'.

Discussion

The purpose of this article was to investigate how customers in B2B contexts approach the sourcing of energy services. To that end, we have explored what characterises end-customers' practices of sourcing energy services, and how customer–provider interfaces enable and/or shape the sourcing of energy services. As captured in our conceptual background, based upon which we conceived energy as a service offering, all of the categories of energy services, the sourcing of energy services, customer–provider interfaces in such sourcing, and, as Table 3 shows, practices of sourcing energy services by customers fall into two overarching service categories—basic energy services and advanced energy services (Kindström & Ottosson, 2016; Kindström et al., 2017)—and four overarching categories of energy services supplied by providers: information-, analysis-, improvement- and contract-oriented services.

Basic and advanced energy services

Energy services are viewed as offerings that rely on products, infrastructure and/or inputs such as labour (Haas et al., 2008; Jonsson et al., 2011). Whereas advanced services include the actual improvement of energy efficiency for customers and the financing of their investments (Kindström et al., 2017), basic energy services, including energy advice, education and training, do not entail activities that actually alter the customers' processes (Kindström & Ottosson, 2016). Our results show that practices of sourcing basic and advanced energy services consolidate experience from various types of customers and energy providers, including ones in housing, facilities management, production and transportation.

In line with Kindström et al. (2017), advanced energy services were found to include activities that directly affected the customers' processes of value creation, including the maintenance of production equipment and energy mapping with suggestions for organisational measures to improve energy performance. Consistent with previous research (e.g. Badi, 2021; Bale et al., 2015; Benedetti et al., 2015; Fell, 2017), our results suggest that energy services are diverse and that no specific definition of *energy services* dominates, as some are quite straightforward and standardised, whereas others are highly complex customised solutions. For that reason, a sourcing approach must be able to absorb energy services' broad range of attributes.

Customers' energy sourcing strategies

Our results indicate that though energy service providers have enhanced their service offerings (Benedetti et al., 2015) and although different types of services contracts have been proposed (e.g. Nolden & Sorrell, 2016), customers' sourcing strategies do not keep pace given their overriding transactional, short-term, cost-based focus. While that approach can be favourable for sourcing standard service offerings and/or when the energy provider's offerings intervene in the customer's core processes to a limited extent (Morley, 2018), our findings suggest that such an approach fails to guide customers towards sourcing more advanced energy service offerings. Those advanced energy service offerings engage with customers' core energy-consuming processes through such means as result-oriented contracts (Nolden & Sorrell, 2016) or even the customer's own value-added offerings, and have to be guided by more strategic, collaborative practices. As explained by Fell (2007), different types of energy services demand different degrees of involvement from customers in the process of value creation. In response to that dynamic, and based on the literature and our empirical results, we propose a typology of four customer–provider interfaces in the following section.

Typology of customer–provider interfaces in the sourcing of energy services

Our research complements recent literature on energy services, which clearly prioritises the perspective of providers (e.g. Bertoldi et al., 2006; Fell, 2017; Morley, 2018) and intermediaries (Nolden & Sorrell, 2016), by taking both a conceptual and empirical stance that prioritises the perspective of end-customers and their sourcing practices as a way of understanding how they acquire providers' service offerings. Our results reveal great variety in the sourcing practices of B2B buyers of energy services, and, in many cases, those practices lean towards a sourcing strategy that presumes a standard energy service that can be acquired through a relationship based on transactional exchange. Considering information- and analysis-oriented services as basic energy services, but improvement- and contract-oriented services as more advanced ones, we propose that customers' sourcing practices vary across four service categories and interfaces, as described in Table 4.

Arm's-length interfaces for sourcing information-oriented energy services

As our findings indicate, information-oriented energy services are regarded as standard services that are commonly acquired through arm's-length market transactions, in which the key criteria for selecting a provider are price and ease of purchase. For such services, customers often have centralised sourcing efforts in their own organisations. Consistent with studies on sourcing strategies (Kraljic, 1983), when sourcing information-oriented energy services, the customer and provider involved in the exchange may act independently of one another, meaning that they lack a mutually beneficial relationship. Thus, the customer and provider of such energy services can behave individualistically without one party influencing the other.

Our empirical material shows that customers and suppliers focus on their own self-interest in arm's-length market transaction interfaces, chiefly because information-oriented energy services are commonly standardised, not complex, obtainable from different providers and sold to diverse customers. As explained by Fensel et al. (2014), current advances fail to offer flexible solutions that can be widely implemented in business environments. The above findings led to our first proposition:

> **Proposition 1**. When sourcing information-oriented energy services, customers and providers may act in their own self-interest through arm's-length market transaction interfaces, which can preclude dealing with major energy-related issues.

Standard interface for sourcing analysis-oriented energy services

Our results also show that analysis-oriented energy services provide suggestions for improvement but do not entail any intervention by providers in customers' organisations. Thus, such energy services continue to be viewed as a commodity that can be obtained through a cost-focused approach to selecting suppliers, one that often involves competitive bidding (Hannon et al., 2013; Ürge-Vorsatz et al., 2009). That perspective imposes boundaries on the providers' incentive and mandate to align standard services to customers' unique needs, even though such services tend to be company-wide instead of process-specific in customers' organisations (Larsen et al., 2012).

Although such an approach to sourcing energy services requires professional knowledge to be part of the service offering, the customer's approach to sourcing—transactional and based on competitive bidding—sets certain limits on engaging with the management of demand (Morley, 2018) as a means of generating energy savings (cf. EU Energy Efficiency Directive, 2018). As our results suggest, such a cost-focused, short-term sourcing strategy among customers does not fully tap into or appreciate the features of the service offerings of providers.

Information- and analysis-oriented energy services primarily concern the customers' organisations or operations, such as maintenance, facility management and production. Both of those types of energy services can be acquired through a standard interface between providers and customers that reflect a transactional, short-term relationship characterised by competitive bidding as a sourcing strategy (Sorrell, 2007). In that approach, the focus is on minimising

Table 4 Typology of provider-customer energy-service interfaces

Type of interface	Type of energy service	Key characteristics
Arm-length	Information	• Customer and provider involve in the exchange may act independently of one another • Customer and provider commonly do not have a mutually beneficial relationship and close interactions • Agreements based on market price • No mutual investment and minimal information exchange
Standard	Analysis	• Customer's approach to sourcing—transactional and competitive bidding • Low levels of trust and minimal collaboration • Cost-focused, short-term sourcing strategy • The provider does not intervene in the customer's organization
Efficient	Improvements	• Provider's intervention into the customer's own, energy-consuming processes • Improvements as a strategic service • Collaborative and long-term approach • Customer's own value-added offers to own customers
Innovative	Contracts	• Trust, collaboration and information sharing • Transcends the customer's internal organization towards the customer's value-added services • The service is based upon the provider's in-depth analysis of the customer organization and operations • Wider view on performance, focusing on innovation and sustainability

the cost of services as well as coordination. Those research results led to our second proposition:

> **Proposition 2**. Customers' approaches to sourcing analysis-oriented energy services based on standard short-term, cost-focused interfaces characterised by competitive bidding may prevent them from realising the full potential of providers' service offerings.

Efficient interface for sourcing improvement-oriented energy services

As our results show, *improvement-oriented energy services* refer to advanced energy services in which the key goal is to reduce the customer's costs of managing and using energy. A distinct feature of such services is the intervention into the customer's energy-consuming processes (Nolden & Sorrell, 2016). That observation aligns with the findings of Matschoss et al. (2015), who pointed out that features reflecting such a short-term approach to sourcing include an output-orientation towards service contracts and some degree of centralisation in procurement in order to strengthen the buyers' position of power against energy service providers. However, that type of service also entails several features that support the categorisation of improvements as strategic services due to requiring a collaborative, long-term approach. Such features include the joint involvement of both providers and customers in service provision (Grönroos, 2004; Matschoss et al., 2015) and the acknowledgement of the limitations of service contracts to anticipate future needs and circumstances.

The category of improvement-oriented energy services also extends the provision of such services from internal processes to the customer's own value-added offerings to their own customers. In that way, the customer's ability to source improvement-oriented energy services can support the achievement of targeted energy savings, thereby complementing technical measures with not only a service-oriented perspective but, more importantly, with the underlying bidirectional approach (Sampson, 2000). As a service, such improvements can benefit from an efficiency-oriented interface because a certain level of collaboration and long-term engagement is needed for providers to both lower the costs of coordination and to create benefits of energy efficiency in customers' energy-consuming processes. Based on the above, we proposed the following:

Proposition 3. Sourcing improvement-oriented energy services can require a certain level of joint involvement and efficiency in the interface between customers and providers in order to realise benefits of energy efficiency in customers' energy-consuming processes.

Innovative interface for sourcing contract-oriented energy services

Finally, our results also show that *contract-oriented energy services* denote the highest level of advanced energy services. Practices for sourcing such services indicate a strong orientation towards a strategic, collaborative approach. Similar to improvement-oriented energy services, contract-oriented ones also improve customers' internal organisations by highlighting (potential) value-added services (Badi, 2021). Furthermore, such services are based on providers' in-depth analysis of customers' organisations and operations, which, as per Backlund and Eidenskog (2013), requires openness and trust. Consistent with Bleyl et al. (2013), prosperous energy service market development requires a strong commitment and a 'driving position' on the client side.

Whereas the other three service categories (information-, analysis- and improvement-oriented energy services) are far more concerned with cost reduction in various ways, sourcing practices associated with contracts seek a wider perspective on performance in which innovation and sustainability are highly apparent features of the services acquired.

Offerings based on contracts require a sourcing practice oriented towards value creation as part of operationalising the customers' business strategy in a collaborative setting that requires behaviour-based instead of outcome-based contracts to manage the collaborative relationship. As Backlund and Eidenskog (2013) indicated, in long-term energy service collaborations, firms lack incentives to behave inefficiently, which shows that trust bridges the gap of power and inequality between actors. In line with previous research (e.g. Dütschke et al., 2018; Palm & Backman, 2020), network relationships also reduce the transaction costs and risks associated with energy efficiency decisions. That dynamic perhaps becomes most apparent in the category of contract-oriented energy services, in which a customer's sourcing practice must keep pace with the provider's service innovations. Thus, firms can benefit from an innovative interface for sourcing contract-oriented energy services. The development of new and innovative service offerings requires mutual adjustments between providers and customers, which can make the flow of knowledge and experience bilateral and mutually beneficial. This leads us to the following proposition:

Proposition 4. Contract-oriented energy services may require the value-creating practice of sourcing to have an innovative interface between customers and providers based on behaviour-based instead of outcome-based contracts to manage their collaborative relationships.

Conclusion

This article has discussed how customers in B2B contexts approach the sourcing of energy services, guided by two RQs: what characterises customers' practices of sourcing energy services? And how do customer–provider interfaces enable and/or shape the sourcing of energy services? As such, this article makes key contributions to the literature on energy service markets, focusing on customers sourcing practices when buying energy services, and customer–provider energy-service interfaces. Whereas earlier studies have focused on a transactional approach (e.g. Larsen et al., 2012; Sorrell, 2007), as well as resource- and service-oriented transitions (Kindström et al., 2017) and ESCO–customer interfaces (Backlund & Eidenskog, 2013; Badi, 2021; Bertoldi et al., 2006; Bleyl et al., 2013) to analyse energy services, little attention has been given to customers in B2B contexts who source energy services.

Our theoretical and empirical approach linked energy as a service offering with customer–provider interfaces in energy service sourcing to further develop current understandings of the practices of sourcing energy services by customers in B2B contexts. As a result, and consistent with previous studies (e.g. Kindström et al., 2017; Sorrell, 2007), we identified two central categories of energy services that are sourced: basic and advanced energy services. Theorising those two categories of energy services as ways of directly and indirectly achieving energy efficiency, combined with the four types of energy services (information-, analysis-, improvement- and contract-oriented services), makes important contributions to the literature on energy services. It does so by unpacking the advantages and challenges of sourcing practices, viewed from the standpoint of customers.

By showcasing various types of energy services in the process of sourcing them, our study has revealed a more holistic picture of complex arrangements between the sourcing of energy services and the consequences experienced from the perspective of customers. The study also advances the literature on energy services by theorising about customer–provider interfaces employed to handle issues associated with sourcing such services (see Table 4). In so doing, we draw attention to aspects of joint exchanges between customers and providers, including the adaptation of activities and specific investments made by the parties involved (Holmlund, 2004; Schurr et al., 2008), and show that contract-oriented energy services represent the highest level of advanced services able to enhance performance, innovation and sustainability. We have articulated four propositions based on our findings concerning types of customer–provider interfaces involved in sourcing energy services.

Finally, we draw attention to the need for research on energy services to strike a balance between providers' and customers' objectives, as well as the importance of developing contract-oriented offerings as a key service for value-creating practices of sourcing such services. The consolidation of sourcing practices serves as a guiding principle that can inform customers' choice of appropriate strategies for the level of energy services desired. However, energy service providers need to understand that their advanced energy service offerings on the market should be matched by the often lagging practices of customers in sourcing advanced energy services.

Implications for policy

Policymakers must understand that the price and transparency of coordination mechanisms need to be complemented by a more relational approach. From that standpoint, energy markets are not viewed as discrete actors but instead as a network of interconnected actors in a service ecosystem. Although that perspective may promote an increased level of depth in the provision of energy services, it may also challenge some fundamental logics in governmental policies. For example, the EU Energy Efficiency Directive stipulates criteria of transparency and non-discrimination, which resonate better with a short-term, transactional approach than with a long-term, relationship-based approach that is suitable for sourcing advanced energy services. However, energy policies currently in force make no specific distinction between the purchasing of products, services or buildings (e.g. EU Energy Efficiency Directive, 2012).

Limitations and avenues for future research

This study has certain limitations. First, the study was based on convenience sampling and interviews with informants from three sectors in Sweden: housing and buildings, logistics and transportation, and production (that is, the manufacturing and processing industries). Due to the qualitative, situated nature of our findings, further empirical studies are needed to verify, fine-tune and compare insights on sourcing energy services beyond those three sectors and geographical boundaries. Second, although we gathered rich material from 18 semi-structured interviews about sourcing energy services, the statistical generalisability of our findings remains to be tested. On that count, another research method that can be used in future investigations on the topic would involve closely following a set of managers currently engaged in sourcing energy services in real time in order to gain deeper insights into the nuances of the roles that they play. Last, in line with the literature (Kindström et al., 2017), we categorised energy services as basic and advanced services. Although doing so allowed a broader, more holistic approach to understanding how customers in B2B contexts handle the sourcing of energy services, we did not explicitly explore the adoption of various sourcing approaches taken to further accelerate energy efficiency.

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References

Aastrup, J., & Halldórsson, Á. (2003). Quality criteria for qualitative inquiries in logistics. *European Journal of Operations Research, 144*(2), 321–332.

Ancarani, A., & Capaldo, G. (2005). Supporting decision-making process in facilities management services procurement: A methodological approach. *Journal of Purchasing and Supply Management, 11*(5/6), 232–241.

Anderson, J. C., & Narus, J. A. (1991). Partnering as a focused market strategy. *California Management Review, 33*(3), 95–113.

Araujo, L., Dubois, A., & Gadde, L. E. (1999). Managing interfaces with suppliers. *Industrial Marketing Management, 28*(5), 497–506.

Axelsson, B., & Wynstra, J. Y. F. (2002). *Buying business services*. Wiley.

Backlund, S., & Eidenskog, M. (2013). Energy service collaborations – It is a question of trust. *Energy Efficiency, 6*(3), 511–521.

Badi, S. (2021). Facilitating ESCO market development through value co-creation: Role of utility sector intermediaries. *Energy Efficiency, 14*(6), 1–22.

Baines, T., & Lightfoot, H. W. (2014). Servitization of the manufacturing firm: Exploring the operations practices and technologies that deliver advanced services. *International Journal of Operations & Production Management, 34*(1), 2–35.

Baker, C. (1997). Membership categorization and interview accounts. In D. Silverman (Ed.), *Qualitative research: Theory, method and practice* (pp. 130–143). Sage.

Bale, C. S., Varga, L., & Foxon, T. J. (2015). Energy and complexity: New ways forward. *Applied Energy, 138*, 150–159.

Benedetti, M., Cesarotti, V., Holgado, M., Introna, V., & Macchi, M. (2015). A proposal for energy services' classification including a product service systems perspective. *Procedia CIRP, 30*, 251–256.

Bertoldi, P., Rezessy, S., & Vine, E. (2006). Energy service companies in European countries: Current status and a strategy to foster their development. *Energy Policy, 34*(14), 1818–1832.

Bleyl, J.W., Adilipour, N., Bareit, M., Kempen, G., Cho, S.-H., Vanstraelen, L. (2013). ESCo market development: A role for Facilitators to play, ECEEE summer study proceedings 2013, (Belambra Les Criques, France).

Blumberg, B., Cooper, D. R., & Schindler, P. S. (2011). *Business research methods* (3rd ed.). McGraw-Hill Education.

Bowen, G. A. (2009). Supporting a grounded theory with an audit trail: An illustration. *International Journal of Social Research Methodology, 12*(4), 305–316.

Brennan, R., & Turnbull, P. W. (1999). Adaptive behavior in buyer–supplier relationships. *Industrial Marketing Management, 28*(5), 481–495.

Brown, D., Hall, S., & Davis, M. E. (2019). Prosumers in the post subsidy era: An exploration of new prosumer business models in the UK. *Energy Policy, 135*, Article 110984.

Bullinger, H. J., Fähnrich, K. P., & Meiren, T. (2003). Service engineering – Methodical development of new service products. *International Journal of Production Economics, 85*(3), 275–287.

Duplessis, B., Adnot, J., Dupont, M., & Racapé, F. (2012). An empirical typology of energy services based on a well-developed market: France. *Energy Policy, 45*, 268–276.

Dütschke, E., Hirzel, S., Idrissova, F., Mai, M., Mielicke, U., & Nabitz, L. (2018). Energy efficiency networks – What are the processes that make them work? *Energy Efficiency, 11*(5), 1177–1192.

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal, 50*(1), 25–32.

Eisenhardt, K. M., Graebner, M. E., & Sonenshein, S. (2016). Grand challenges and inductive methods: Rigor without rigor mortis. *Academy of Management Journal, 59*(4), 1113–1123.

Elf, P., Werner, A., & Black, S. (2022). Advancing the circular economy through dynamic capabilities and extended customer engagement: Insights from small sustainable fashion enterprises in the UK. *Business Strategy and the Environment, 31*(6), 2682–2699.

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics, 5*(1), 1–4.

European Commission. (2018). *Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency.* https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2002&from=EN

Fell, M. J. (2017). Energy services: A conceptual review. *Energy Research & Social Science, 27*, 129–140.

Fensel, A., Kumar, V., & Tomic, S. D. K. (2014). End-user interfaces for energy-efficient semantically enabled smart homes. *Energy Efficiency, 7*(4), 655–675.

Fitzsimmons, J. A., Noh, J., & Thies, E. (1998). Purchasing business services. *Journal of Business & Industrial Marketing, 13*(4/5), 370–380.

Fusch, P. I., & Ness, L. R. (2015). Are we there yet? Data saturation in qualitative research. *The Qualitative Report, 20*(9), 1408–1416.

Gadde, L. E., & Snehota, I. (2000). Making the most of supplier relationships. *Industrial Marketing Management, 29*(4), 305–316.

Gaspari, M., Lorenzoni, A., Frías, P., & Reneses, J. (2017). Integrated energy services for the industrial sector: An innovative model for sustainable electricity supply. *Utilities Policy, 45*, 118–127.

Gehman, J., Glaser, V. L., Eisenhardt, K. M., Gioia, D., Langley, A., & Corley, K. G. (2018). Finding theory–method fit: A comparison of three qualitative approaches to theory building. *Journal of Management Inquiry, 27*(3), 284–300.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational Research Methods, 16*(1), 15–31.

Griggs, S. (1987). Analysing qualitative data. *Journal of the Market Research Society, 29*(1), 15–34.

Grönroos, C. (1998). Marketing services: The case of a missing product. *Journal of Business & Industrial Marketing, 13*(4/5), 322–338.

Grönroos, C. (2004). The relationship marketing process: Communication, interaction, dialogue, value. *Journal of Business & Industrial Marketing, 19*(2), 99–113.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods, 18*(1), 59–82.

Haas, R., Nakicenovic, N., Ajanovic, A., Faber, T., Kranzl, L., Müller, A., & Resch, G. (2008). Towards sustainability of energy systems: A primer on how to apply the concept of energy services to identify necessary trends and policies. *Energy Policy, 36*(11), 4012–4021.

Halldórsson, Á., Gremyr, I., Börjesson, S., & Wallbaum, H. (2018, June 24–26). *Services supporting users: The case of energy services to end-users* Proceedings, 25th International Annual EurOMA Conference, Budapest, Hungary.

Handfield, R. B. (2004). The impact of energy deregulation on sourcing strategy. *Journal of Supply Chain Management, 40*(1), 38–48.

Hannon, M. J., Foxon, T. J., & Gale, W. F. (2013). The co-evolutionary relationship between Energy Service Companies and the UK energy system: Implications for a low-carbon transition. *Energy Policy, 61*, 1031–1045.

Hill, P. (1999). Tangibles, intangibles and services: A new taxonomy for the classification of output. *The Canadian Journal of Economics/revue Canadienne D'economique, 32*(2), 426–446.

Holmlund, M. (2004). Analyzing business relationships and distinguishing different interaction levels. *Industrial Marketing Management, 33*(4), 279–287.

Hoover, R. S., & Koerber, A. L. (2011). Using NVivo to answer the challenges of qualitative research in professional communication: Benefits and best practices. *IEEE Transactions on Professional Communication, 5*(1), 68–82.

IEA. (2017). Digitalization & Energy. *IEA, Paris,*. https://doi.org/10.1787/9789264286276-en

Jackson, R. W., Neidell, L. A., & Lunsford, D. A. (1995). An empirical investigation of the differences in goods and services as perceived by organisational buyers. *Industrial Marketing Management, 24*(2), 99–108.

Jonsson, D. K., Gustafsson, S., Wangel, J., Höjer, M., Lundqvist, P., & Svane, Ö. (2011). Energy at your service: Highlighting energy usage systems in the context of energy efficiency analysis. *Energy Efficiency, 4*(3), 355–369.

Kindström, D., & Ottosson, M. (2016). Local and regional energy companies offering energy services: Key activities and implications for the business model. *Applied Energy, 171*, 491–500.

Kindström, D., Ottosson, M., & Thollander, P. (2017). Driving forces for and barriers to providing energy services – A study of local and regional energy companies in Sweden. *Energy Efficiency, 10*(1), 21–39.

Kowalska-Pyzalska, A. (2018). What makes consumers adopt to innovative energy services in the energy market? A review of incentives and barriers. *Renewable and Sustainable Energy Reviews, 82*(3), 3570–3581.

Kumar, V., Rajan, B., Gupta, S., & Pozza, I. D. (2019). Customer engagement in service. *Journal of the Academy of Marketing Science, 47*(1), 138–160.

Lakemond, N., Berggren, C., & van Weele, A. (2006). Coordinating supplier involvement in product development projects: A differentiated coordination typology. *R&D Management, 36*(1), 55–66.

Langley, A. (1999). Strategies for theorizing from process data. *Academy of Management Review, 24*(4), 691–710.

Larsen, P. H., Goldman, C. A., & Satchwell, A. (2012). Evolution of the US energy service company industry: Market size and project performance from 1990–2008. *Energy Policy, 50*, 802–820.

Lütjen, H., Tietze, F., & Schultz, C. (2017). Service transitions of product-centric firms: An explorative study of service transition stages and barriers in Germany's energy market. *International Journal of Production Economics, 192*, 106–119.

Matschoss, K., Kahma, N., & Heiskanen, E. (2015). Pioneering customers as change agents for new energy efficiency services – An empirical study in the Finnish electricity markets. *Energy Efficiency, 8*(5), 827–843.

Miles, M. B., Huberman, A. M., & Saldana, J. (2020). *Qualitative data analysis: A methods sourcebook* (4th ed.). Sage.

Morley, J. (2018). Rethinking energy services: The concept of "meta-service" and implications for demand reduction and servicizing policy. *Energy Policy, 122*, 563–569.

Nag, R., & Gioia, D. A. (2012). From common to uncommon knowledge: Foundations of firm-specific use of knowledge as a resource. *Academy of Management Journal, 55*(2), 421–457.

Nolden, C., & Sorrell, S. (2016). The UK market for energy service contracts in 2014–2015. *Energy Efficiency, 9*, 1405–1420.

Nolden, C., Sorrell, S., & Polzin, F. (2016). Catalysing the energy service market: The role of intermediaries. *Energy Policy, 98*, 420–430.

Nurdiawati, A., & Urban, F. (2022). Decarbonising the refinery sector: A socio-technical analysis of advanced biofuels, green hydrogen and carbon capture and storage developments in Sweden. *Energy Research & Social Science, 84*, Article 102358.

Palm, J., & Backman, F. (2020). Energy efficiency in SMEs: Overcoming the communication barrier. *Energy Efficiency, 13*(5), 809–821.

Pätäri, S., & Sinkkonen, K. (2014). Energy service companies and energy performance contracting: Is there a need to renew the business model? Insights from a Delphi study. *Journal of Cleaner Production, 66*, 264–271.

Pätäri, S., Annala, S., Jantunen, A., Viljainen, S., & Sinkkonen, A. (2016). Enabling and hindering factors of diffusion of energy service companies in Finland – Results of a Delphi study. *Energy Efficiency, 9*(6), 1447–1460.

Patton, M. Q. (2002). Two decades of developments in qualitative inquiry: A personal, experiential perspective. *Qualitative Social Work, 1*(3), 261–283.
Patton, E., & Appelbaum, S. H. (2003). The case for case studies in management research. *Management Research News, 26*(5), 60–71.
Pemer, F., Werr, A., & Bianchi, M. (2014). Purchasing professional services: A transaction cost view of the antecedents and consequences of purchasing formalization. *Industrial Marketing Management, 43*(5), 840–849.
Pettigrew, A. M. (1990). Longitudinal field research on change: Theory and practice. *Organization Science, 1*(3), 267–292.
Sampson, S. E. (2000). Customer–supplier duality and bidirectional supply chains in service organisations. *International Journal of Service Industry Management, 11*(4), 348–364.
Schurr, P. H., Hedaa, L., & Geersbro, J. (2008). Interaction episodes as engines of relationship change. *Journal of Business Research, 61*(8), 877–884.
Soroye, K. L., & Nilsson, L. J. (2010). Building a business to close the efficiency gap: The Swedish ESCO experience. *Energy Efficiency, 3*(3), 237–256.
Sorrell, S. (2007). The economics of energy service contracts. *Energy Policy, 35*(1), 507–521.
Sorrell, S., Dimitriopolous, J., & Sommerville, M. (2009). Empirical estimates of direct rebound effects: A review. *Energy Policy, 37*(4), 1356–1371.
Sorrell, S. (2005). *The contribution of energy service contracting to a low carbon economy* (Technical Report 37). Tyndall Centre for Climate Change Research. http://sro.sussex.ac.uk/id/eprint/53967/
Stock, J. R., & Zinszer, P. H. (1987). The industrial purchase decision for professional services. *Journal of Business Research, 15*(1), 1–16.
Swedish Energy Agency. (2013). *Energitjänster i Sverige – Statusrapport för tjänster för energieffektivisering*. https://energimyndigheten.a-w2m.se
Swedish Energy Agency (2017). *Energy in Sweden 2017.* https://www.districtenergy.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=0358112c-d5e3-f2e0-40b8-e3c97e57a67d&forceDialog=0
Ürge-Vorsatz, D., Novikova, A., Köppel, S., & Boza-Kiss, B. (2009). Bottom–up assessment of potentials and costs of CO2 emission mitigation in the buildings sector: Insights into the missing elements. *Energy Efficiency, 2*(4), 293–316.
van der Valk, W., & Rozemeijer, F. (2009). Buying business services: Towards a structured service purchasing process. *Journal of Services Marketing, 23*(1), 3–10.
van der Valk, W., Wynstra, F., & Axelsson, B. (2009). Effective buyer–supplier interaction patterns in ongoing service exchange. *International Journal of Operations & Production Management, 29*(8), 807–833.
Vine, E. (2005). An international survey of the energy service company (ESCO) industry. *Energy Policy, 33*(5), 691–704.
Voss, C., Tsikriktsis, N., & Frohlich, M. (2002). Case research in operations management. *International Journal of Operations & Production Management, 22*(2), 195–219.
Voss, C., Perks, H., Sousa, R., Witell, L., & Wünderlich, N. V. (2016). Reflections on context in service research. *Journal of Service Management, 27*(1), 30–36.
Webster, C. (1993). Buyer involvement in purchasing success. *Industrial Marketing Management, 22*(3), 199–205.
Weiller, C., & Neely, A. (2014). Using electric vehicles for energy services: Industry perspectives. *Energy, 77*, 194–200.
Winston, A., Favaloro, G., & Healy, T., (2017). Energy strategy for the C-suite. *Harvard Business Review,* 138–146.
Wren, D. A. (1967). Interface and interorganizational coordination. *Academy of Management Journal, 10*(1), 69–81.
Wynstra, F., Axelsson, B., & van der Valk, W. (2006). An application-based classification to understand buyer-supplier interaction in business services. *International Journal of Service Industry Management, 17*(5), 474–496.
Yin, L., & Qiu, Y. (2022). Long-term price guidance mechanism of flexible energy service providers based on stochastic differential methods. *Energy, 238*, 121818.